REMARKS

Claim 19 has been amended. Claims 1, 4, 14-16, and 19 remain in the application.

Claims 19 and 20 have been rejected as being obvious over the admitted prior art (APA) (defined as a microcomponent glued to a substrate)in view of U.S. Patent Publication 2004/0265504 to Magnin. This rejection is traversed.

As discussed during the interview, claim 19 has been amended to depend from claim 1. Neither the APA nor Magnin show or describe selectively melting a powder layer and removing the powder layer not incipiently melted by the focusable heat source. Instead, APA shows only that microcomponents can be glued to a substrate by prior art methodologies, and Magnin shows the use of electrostatic attraction instead of using a focusable heat source followed by removal of the powder layer which is not heated. The substance of claim 20, which is supported by the specification page 6, line 20, has been incorporated into base claim 20.

Claims 1, 4, 19, and 20 have been rejected as being obvious over the APA in view of German Patent DE3739333 to Moeller in view of Magnin and U.S. Patent 4,183,978 to Hefele. Claims 14-16 have been rejected as being obvious over the APA/Moeller/Magnin/Hefele combination further in view of U.S. Patent 6,099,679 to Karem. The rejections are traversed.

The most significant difference between the invention and the prior art references of record is that the claimed invention is focused on the world of microcomponents rather than the macroscopic world. The office action relies on macroscopic techniques described in Magnin and Hefele, which are not directed to adhering microcomponents to substrates, in an effort to piece together the invention based only on the patent application disclosure. In the microscopic world, the selective bonding of microcomponents using a hot melt adhesive is novel. One cannot easily transfer methods from the macroscopic world, such as methods from Magnin or Hefele, to the world of microsystems since the behavior of the adhesive is not necessarily the same, and the world of microsystems requires applying a layer of the adhesive in the area of micrometers which is difficult to achieve. To highlight the "micro"

requirements of the claimed invention, base claim 1 has been amended to require that the microcomponent is less than 1000μm in size (page 6, line 2), and that the granules of adhesive range from 0.5 to 150μm in size (page 6, line 14).

Claim 1 requires the combination of (A) using a non-reactive hot melt adhesive which pulverent but which is solved in a dispersion, and (B) applying the adhesive through a contoured screen by a screen printing technique and applying a microcomponent to a substrate by selectively melting the adhesive and bonding the microcomponent to the substrate. As explained on page 3, lines 15 et seq., a non-reactive hotmelt adhesive provides bonding that will not allow displacement of the microcomponent, "not even over tiny distances in the μm range". As noted on page 4, lines 28-29, with these adhesives curing takes place by cooling, and the cure time can be made very short to prevent displacement of the microcomponents. The references of record do not address the unique and demanding glue placement, and fast curing issues required to keep a microcomponent in place and not moveable or displaceable by measurements in the micrometer range. Further, as specified in claim 1, the hot melt adhesive is present in some areas, but not other areas. This is accomplished by application through a contoured screen. In sharp contrast, Magnin (which is not related to gluing microcomponents to substrates), uses electrostatic attraction to place adherent at desired location. As discussed during the interview, this is an entirely different methodology for locating adherent compound. Further, with respect to claim 19 which requires removing the powder layer not incipiently melted, there is no corresponding step or procedure in an electrostatic attraction process such as taught in Magnin.

The prior art

As best can be understood from the office action, the APA stands for the proposition that it is known to glue microcomponents to a substrate. This is correct and is discussed in detail on pages 1 and 2 of the application. However, it is noted that pages 1 and 2 of the application discuss in detail problems which arise when gluing microcomponents to a substrate. Page 1 highlights the competing desires of having the pot life as long as possible to allow rational joining (i.e., if it is not joined correctly, the microcomponent will not function) and having the pot life as short as possible so that a placed microcomponent will not be

subsequently displaced when placing other microcomponents or performing other operations. Page 2 of the application identifies two prior German patents where the methodologies employed have led to problems (e.g., insufficient wetting leading to poor joints (page 2, lines 15-17), and the requirement of using complex processes and equipment. Thus, the claimed invention can best be understood as providing a methodology of achieving the goal of successfully gluing microcomponents to substrates for subsequent use, without the disadvantages of other prior techniques.

The Magnin reference appears to be being relied upon as showing that is known to bond substrates with a powder adhesive. It should be clear that a powder adhesive of Magnin is not a "dispersion", and the powder adhesive of Magnin is being applied to a paper or plastic by electrostatic application of particlesc. Since the particles are being attracted to the paper or plastic by electrostatic attraction, it should be understood that there is nothing akin to applying a dispersion through a contoured screen being performed in Magnin. Since neither the APA nor Magnin show the use of a contoured screen or the use of a dispersion being applied to a substrate through the screen, no combination of the APA and Magnin would make claim 19 obvious. Further, Magnin does not describe bonding microcomponents that are less than 1000μm in size, or non-reactive hot melt pulverent that has granules that are .5-150μm in size, as is required in base claim 1.

German patent DE 3739333 to Moeller is discussed on page 2 of the present application. As indicated in the present application, Moeller describes a process where a wafer is treated with an adhesive varnish. Then, the wafer is sawn to form chips, and the chips are then joinable by using a laser to heat the varnish on the bottom of the chips. Notably, Moeller does not describe a process where adhesive is applied to some locations but not other locations as is required in claim 1. Moeller has nothing akin to a contoured screen which would have openings through which an adhesive, specifically an adhesive dispersion, would be applied to a substrate or chip at certain locations but not other locations.

As best can be understood from the office action, it appears that Moeller is being relied upon for the same reason as the APA. That is, it is known to join microcomponents to substrates using adhesives. The office action incorrectly fails to recognize that the Moeller is

applying varnish to the entire wafer and then sawing the wafer into chips. Moeller does not describe application to microcomponent that are less that 1000μm in size or application to a substrate a specific locations for joining a microcomponent that is less than 1000μm in size, as is required by amended claim 1. In short, Moeller does not provide any mechanism for getting the varnish onto the bottom of a microcompoent that is separated from a wafer. Further, it is incorrect to conclude Moeller is describing putting adhesive onto a substrate to which the chip is joined. Rather, Moeller describes putting the adhesive onto the bottom of the chip by first putting it on the bottom of the wafer, then sawing it up. The main focus of Moeller appears to be the laser heating. The office action correctly concludes that Moeller (1) does not show the use of a pulverant adhesive as a dispersion, and (2) does not show applying the dispersion through a contoured screen to selected areas of a substrate.

As noted above, Magnin describes the use of electrostratic attraction for application of particles to paper or plastic. Thus, Magnin, like APA and Moeller, (1) does not show the use of a pulverant adhesive as a dispersion, (2) does not show applying the dispersion through a contoured screen to selected areas of a substrate, and (3) does not show a process for joining microcomponents that are less than 1000 μm in size to substrates or show use of hot melt pulverent with granules of 0.5-150μm in size. The office action correctly admits that Magnin does not show the use of a contoured screen. In addition, it is noted that Magnin does not show the use of a dispersion.

Hefele shows a discontinuous pattern, in raster-like formation, of heat sealing adhesive applied to clothing (see Abstract). Hefele particularly relates to the use of two superposed layers of adhesive, where the different layers have different qualities (Abstract). As noted in column 1, lines 7-11, the Hefele invention is used for stiffening, or as a patch or lining material, articles of clothing. None of the two layers of Hefele are intended to fix any component to the textile material. Instead, the two layers are used as discontinous coating whereby the lower layer fixes the upper layer. As noted in column 1, lines 20-21, the discontinuous nature of the adherent material is to preserve the "textile feel" of the insert and the cloth (i.e., it is not for the purpose of securing anything (e.g., a microcomponent) at a precise location on a substrate). Thus, Hefele is drawn to a completely different technical

field than the claimed invention (textiles versus microcomponent jointing), and Hefele solves different problems (stiffening or patching clothing versus mechanically and electrically joining a microcomponent to a substrate), and would not be probative for one of ordinary skill in the art in the technical field of the invention.

As best can be understood from the office action, it appears that the Examiner is equating screen printing described in Hefele to "applying a pulverulent hotmelt adhesive as a dispersion through a contoured screen" (emphasis added). This is simply incorrect. First, there appears to be a misunderstanding of the nature of a dispersion, as page 5 equates an adhesive being dispersed to a dispersion. A dispersion is a system of dispersed particles suspended in a solid, liquid or gas. In contrast, Hefele uses the word "disperse" only in the sense of "to distribute" or "to scatter". Applying the hot melt adhesive as a dispersion means that the adhesive is already suspended within the solid, liquid or gas. It does not mean that is dispersed over the surface of the substrate as stated in the office action. Second, in Hefele, the hot melt adhesive is dispersed as a powder or flake material (column 4, lines 31-64) onto a paste. As stated in column 4, lines 40-42, the powder or flake that is not secured to the paste is sucked off. Hence, it should be quite clear that Hefele does not show putting hot melt adhesive (in any form, including in the form of a dispresion) through a contoured screen. Rather, Hefele screen prints a paste, then puts a powder or flake hot melt material over the entire surface, and then the locations where the powder or flake is not adhered to paste are cleaned off by suction. Thus, the conclusion that Hefele shows the use of a contoured screen to control the specific locations of adhesive is incomplete, at least as it applies to the present invention, as Hefele is clearly using already applied paste to control the location of hot melt adhesive. Moreover, Hefele does not show a process for joining microcomponents that are less than 1000 μm in size to substrates or show use of hot melt pulverent with granules of 0.5-150μm in size. As such, Hefele does not make up for the deficiencies of Magnin, Moeller and APA.

Furthermore, it should be recognized that APA/Moeller, Magnin, and Hefele are drawn to different endeavors, and would not be combined with each other (except through impermissible hindsight reconstruction) in the manner suggested in the office action. For

convenience, a computer printout discussing microelectromechanical systems is attached, and it is the joining of these types of components which are the focus of the claimed invention. As noted above, Moeller coats the entire surface of a wafer with adherent varnish then cuts up the wafer into chips. Magnin coats the entire surface of a plastic or paper article (using electrostatic attraction of adherant particles). Hefele, shows printing a first layer of adherant material, in raster like format as opposed to continuous), onto clothing. A skilled person has no reason to combine the textile coating method of Hefele with the paper/plastic production method of Magnin. As Magnin targets applying an adhesive over the whole surface of, e.g., a paper sheet, in order to produce self adhesive paper products or the like where the adhesive will become activated to become tacky when using the product, a skilled person would not look to Hefele which targets manufacturing clothing with a discontinous coating layer made from an adhesive material which is not made tacky when used. One of ordinary skill in the art would find these to be contradictory objectives on at least two different counts. In addition, the microcomponents of APA/Moeller, require precise joining of a component to a substrate, and, in sharp contrast, neither Magnin nor Hefele require precise joining. Thus, one of ordinary skill in the art who has a significant concern about precise joining of microcomponents would not be looking to solutions for different problems which do not require precise joining.

In view of the above, no combination of APA, Moeller, Magnin and Hefele would make the claimed invention obvious to one of ordinary skill in the art.

As discussed in detail above, the APA/Moeller/Magnin/Hefele combination does not make obvious (1) the use of a pulverant adhesive as a dispersion, or (2) applying hot melt adhesive to precise locations by applying the dispersion through a contoured screen to selected areas of a substrate, or (3) a process for joining microcomponents that are less than 1000 μm in size to substrates or show use of hot melt pulverent with granules of 0.5-150μm in size. Karem does not make up for these deficiencies. Karem shows application of powder adherent to a surface in a dry state and using heat followed by electromagnetic radiation to cure the powder and join two surfaces together. Thus, Karem also does not show (1) the use of a pulverant adhesive as a dispersion, or (2) applying hot melt adhesive to precise locations by

applying the dispersion through a contoured screen to selected areas of a substrate, or (3) a process for joining microcomponents that are less than 1000 μm in size to substrates or show use of hot melt pulverent with granules of 0.5-150μm in size. Hence, claims 14-16 would not be obvious over a combination of APA, Moeller, Magnin, Hefele, and Karem for at least these reasons.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,

Michael E. Whitham
Reg. No. 32,635

Whitham, Curtis, Christofferson & Cook, P. C.
11491 Sunset Hills Road, Suite 340
Reston, Virginia 20190
(703) 787-9400

Customer Number: **30743**